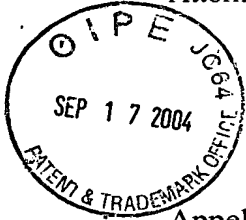


Application No. 09/985,728
Paper Dated: September 14, 2004
Appellants' Reply Brief
Attorney Docket No. 3693-011770 (LC-413)

AF 280 JFW



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appellants : Lawrence N. Crane et al.
Application No. : 09/985,728
Confirmation No. : 4228
Filed : November 6, 2001
Title : WAFER APPLIED FLUXING AND UNDERFILL
MATERIAL, AND LAYERED ELECTRONIC ASSEMBLIES
MANUFACTURED THEREWITH
Group Art Unit : 2827
Examiner : Alonzo Chambliss

MAIL STOP – APPEAL BRIEF PATENTS
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF TO EXAMINER'S ANSWER PURSUANT TO 37 CFR §1.193(b)

Sir:

The present paper represents a Reply Brief in response to the Examiner's Answer mailed on July 14, 2004 for the above-identified Appeal, response to which is due by September 14, 2004. The Board is respectfully requested to consider this Reply Brief directed to new points of argument raised in the Examiner's Answer.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to MAIL STOP-APPEAL BRIEF PATENTS Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 14, 2004.

Lisa R. McNany

(name of person depositing papers or fees)

Lisa R. McNany 09/14/2004
Signature Date

Appellants thank the Examiner for withdrawing the rejection based on 35 U.S.C. §112, second paragraph, and for the admission that claim 57 is allowable over the prior art if presented in independent form.

With respect to the Grounds of Rejection set forth in Paragraph (10) in the Examiner's Answer, Appellants wish to point out that the claims identified in the rejections are inconsistent with the previous rejections. In particular, the Examiner states that claim 50 is rejected under 35 U.S.C. §102(e), second paragraph¹, although such rejection has not been heretofor presented. It appears that the Examiner has attempted to group the rejections in Paragraph (10) according to the Appellants Grouping of Claims set forth in the Appeal Brief. In any event, the rejection of claim 50 set forth in the prior Office Action represents a rejection under 35 U.S.C. §103(a), not under §102(e) as set forth in the Examiner's Answer.

With respect to the rejection of the claims, the Examiner's Answer alleges that Gilleo teaches a curable material which is a thermosetting underfill material. (*Examiner's Answer* at p. 4, paragraph 3). This is simply not the case. All of the claims of the present invention require that the underfill material be a curable thermosetting underfill material. In the Appeal Brief, Appellants have argued that Gilleo fails to teach curable thermosetting materials as the underfill, and have demonstrated how Gilleo instead teaches thermoplastic materials which melt to bond a chip die to a carrier substrate thereafter. To refute Appellants' position, the Examiner's Answer specifically alleges that: "Gilleo teaches a curable material (i.e., a thermosetting underfill material) that is capable of curing under heat to attach the chip to the circuit board (see col. 5, lines 65-67 and col. 6, lines 1-7). Once the thermosetting underfill material is in a cured state, it will firmly bond the chip to the circuit board." (*Examiner's Answer* at p. 4, paragraph 3). Such assertions by the Examiner, however, are a misrepresentation of the actual teachings of Gilleo. More specifically, the noted passages from Gilleo never mention a thermosetting underfill material, let alone any curing of the underfill. Instead, col. 5, line 64 through col. 6, line 7 reads as follows:

"Alternatively, a standard flip chip bonder that can apply heat and pressure can be employed instead of the reflow oven. In that embodiment, the flip chip coated with

¹ Appellants are unaware of any second paragraph of §102(e), and therefore assume this to be a typographical error referring to §102(e).

the flux and underfill is placed into contact with the conductive pads on the circuit board and heat from the bonder head will activate the flux, form joints by reflowing the solder bumps, and cause the underfill and flux system to bond tightly to the board. The use of a standard flip chip bonder would allow a flip chip to be assembled to a board that already contained mounted components. This method could also be used to assemble a chip at a site that is being reworked."

Contrary to the Examiner's assertions, nothing in the cited passage states that any curing is taking place with the underfill material of Gilleo, let alone any curing of a thermosetting material. Instead, the Examiner is merely speculating that the materials taught by Gilleo would cure, without any specific teachings in this respect. Such unsupported allegations without any specific teachings from the reference do not provide a sound basis for rejection of the claims as being anticipated or obvious. Despite the Examiner's allegations in the Examiner's Answer, Gilleo fails to specifically discuss curing of the underfill material. This is entirely consistent with Appellants' position, in that the thermoplastic materials of Gilleo melt when heated as opposed to curing. The overall purpose of Gilleo is to provide a material which can melt during heating so that thereafter it may bond properly with a substrate. Such melting is a property of a thermoplastic material. Curable thermosetting materials, on the other hand, harden or cure under heat.

Appellants have consistently maintained that Gilleo fails to disclose the use of curable thermosetting materials as the sole underfill material. The Examiner, on the other hand, is apparently relying on a single phrase in Gilleo as allegedly teaching the use of thermosetting materials as an underfill, to the exclusion of the entire purpose and intent of Gilleo, which is clearly to provide a thermoplastic material instead of a thermosetting material. More particularly, the Examiner concludes that Gilleo teaches the use of thermosetting underfill materials based merely upon the single statement in Gilleo that the underfill material is preferably a thermoplastic or a thermoset having a specific crosslink density. As set forth in great detail in Appellants' Appeal Brief, however, the overall teachings of Gilleo clearly demonstrate Gilleo's belief that thermosets cannot function in the same capacity as thermoplastics, and therefore Gilleo uses thermoplastics as a substitute for

thermosetting materials as an underfill. As such, the Examiner's rejection based on a casual statement in Gilleo that a thermoset material could be a substitute for a thermoplastic material runs entirely counter to the overall explicit teachings in Gilleo, which is clearly directed to the use of thermoplastics instead of thermosets.

The Examiner's Answer recognizes the discrepancies between Appellants' invention and Gilleo by noting that "Appellant's claims do not recite that the thermosetting material is the only material in the underfill." Appellants have discussed with the Examiner further amendment to the claims to define the underfill material as "consisting essentially of a curable thermosetting underfill composition". The Examiner, however, has maintained the position that Gilleo teaches thermosetting materials as the underfill, despite the explicit teachings away from the present invention in Gilleo.

All of the claims of the present invention require a curable thermosetting underfill material. Gilleo does not teach or suggest thermosetting underfills, and does not teach or suggest curable thermosetting underfills. Accordingly, the Section 102 and 103 rejections should be overturned.

Still further, with respect to the third grouping of claims, the Examiner's Answer admits that claim 57 is allowable if presented in independent form, "since the process step of dispensing a second thermosetting underfill composition flowable on the thermosetting underfill composition around the electrical contacts is not taught by any of the cited prior art." (*Examiner's Answer* at p. 6, paragraph 2). In view of such recognition, it is submitted that all of the claims 25-48, 51, 52 and 57-61 are patentable. In allowing claim 57 while rejecting the remainder of the third grouping of claims, the Examiner alleges that "claim 25 differs from claim 57, which includes claims 55 and 54, since the prior art discloses the final product of claim 25 and the dispensing step is not recited in the claim." The Examiner's Answer further asserts that Fig. 8B of Wang discloses both a first thermosetting composition 210 and a second thermosetting composition 310, and then alleges that "the final product [of Wang] allows both first and second thermosetting underfill compositions 210, 310 to be present on the chip die." (*Examiner's Answer* at p. 6, paragraph 1). The Examiner's conclusion, however, is incorrect. Fig. 8B of Wang fails to teach a chip die, i.e., the unattached chip portion, with both the first and second underfill compositions thereon. Instead, as discussed in Wang, the second thermosetting composition is applied to a

separate substrate, and not over the first thermosetting composition on the chip die. The Examiner recognizes this as a patentable feature through the allowance of claim 57. Although a product claim, claim 25 specifically recites that the second thermosetting underfill material is dispensed over the first thermosetting underfill material on the chip die, before mating of the chip die to the carrier substrate, thus creating a chip die with both the first and second thermosetting underfill materials thereon. It is therefore submitted that claim 25 and the remainder of the third grouping of claims are patentable for the same reasons as claim 57.

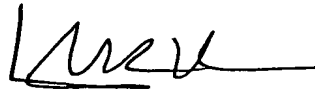
Thus, it is clear from the arguments set forth in the Appellants' Brief and clarified herein that the present claims define patentable subject matter over the prior art. Reversal of the Examiner's rejections is therefore respectfully solicited.

Any questions or comments regarding this Reply Brief should be directed to Appellants' undersigned representative, who can be reached by telephone at 412-471-8815, or at the address identified below.

Respectfully submitted,

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By



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